Cryogenic operation of GaAs based multiplier chains to 400 GHz

Alain Maestrini, David Pukala, Goutam Chattopadhyay, Jean Bruston, Erich Schlecht,
Frank Maiwald, Suzanne Martin, Lorene Samoska and Imran Mehdi
Caltech – Jet Propulsion Laboratory
MS 168-314
4800 Oak Grove dr.
Pasadena, CA 91109
818-354-45892 - maestrin@merlin.jpl.nasa.gov

The FIRST/HIFI mission permits the multiplier chains to be cooled to 120-150 K in order to improve the available output power. This presentation will discuss the impact of cooling on GaAs planar Schottky varactor diodes for flight applications. Thermal management of the GaAs chip is studied with the aid of a thermal model and appropriate design changes are made to the technology. A diode model that includes cooling effects has been developed and will be discussed along with its effect on multiplier design. Preliminary measurements at 120-150 K done on individual multipliers at 200 and 400 GHz and on multiplier chains to 400 GHz will be presented.

The research described in this publication was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.